

Unit 9

Day 3

More Equations with Radicals

$$1) \quad (\sqrt{y} = \sqrt{y-5} + 1)^2$$

$$y = y - 5 + 2\sqrt{y-5} + 1$$

$$4 = 2\sqrt{y-5}$$

$$(2)^2 = (\sqrt{y-5})^2$$

$$4 = y - 5$$

$$9 = y$$

$$5 = 2\sqrt{x+5}$$

$$\sqrt{9} = \sqrt{4} + 1$$

$$3 = 2 + 1\sqrt{\quad} \quad \{9\}$$

$$2) \quad (\sqrt{x+2})^2 = (\sqrt{4+7\sqrt{x}})^2$$

$$x + 4\sqrt{x} + 4 = 4 + 7\sqrt{x}$$

$$x = 3\sqrt{x}$$

$$x^2 = 9x$$

$$x^2 - 9x = 0$$

$$x(x-9) = 0$$

$$\begin{matrix} x=0 \\ \sqrt{\phantom{x}} \end{matrix} \quad \begin{matrix} x=9 \\ \sqrt{\phantom{x}} \end{matrix}$$

$$\{0, 9\}$$

$$\frac{x}{3} = \sqrt{x}$$

$$\frac{x^2}{9} = x$$

$$\frac{x^2}{x} = \frac{9x}{x}$$

$$x = 9$$

$$\begin{matrix} \frac{x^2}{9} - x = 0 \\ x^2 - 9 = 0 \end{matrix}$$

$$\begin{array}{l} 0 + 2 = \sqrt{4} \\ 2 = 2 \checkmark \end{array}$$

$$\begin{array}{l} 3 + 2 = \sqrt{25} \\ 5 = 5 \checkmark \end{array}$$

$$3) \quad \sqrt{3-x} + \sqrt{3+x} = x$$

$$\sqrt{3-x} = x - \sqrt{3+x}$$

$$3-x = x^2 - 2x\sqrt{3+x} + 3+x \quad \sqrt{3-2\sqrt{2}} + \sqrt{3+2\sqrt{2}} = 2\sqrt{2}$$

$$(2x\sqrt{3+x})^2 = (x^2 + 2x)^2$$

$$4x^2(3+x) = x^4 + 4x^3 + 4x^2$$

$$12x^2 + 4x^3 = x^4 + 4x^3 + 4x^2$$

$$0 = x^4 - 8x^2$$

$$0 = x^2(x^2 - 8)$$

$$x^2 = 0$$

$$x \neq 0$$

$$x^2 = 8$$

$$x = \pm 2\sqrt{2}$$

$$x \neq -2\sqrt{2}$$

$$x = 0$$

$$\sqrt{3} + \sqrt{3} = 0$$

$$x = 2\sqrt{2}$$

$$4) \quad (3m+7)^{\frac{2}{3}} = (m+3)^{\frac{1}{3}}$$

$$\sqrt[3]{(3m+7)^2} = \sqrt[3]{m+3} \quad \leftarrow$$

$$(3m+7)^2 = m+3$$

$$9m^2 + 42m + 49 = m + 3$$

$$9m^2 + 41m + 46 = 0$$

$$a=9 \quad b=41 \quad c=46$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$m = \frac{-41 \pm \sqrt{41^2 - 4(9)(46)}}{2(9)} =$$

$$\begin{aligned} m &= -2 \\ m &= -\frac{23}{9} \end{aligned}$$

HOMEWORK: p. 137: 33-38, 43, 44, extra problems

Extra Problems:

$$1) \sqrt{x+4} - \sqrt{x+3} = \sqrt{3x+10}$$

$$2) \sqrt{3\sqrt{2m+3}} = \sqrt{5m-6}$$

$$3) 3 - \sqrt{x} = \sqrt{2\sqrt{x} - 3}$$

$$4) (2k-9)^{-\frac{2}{3}} + 4(2k-9)^{\frac{1}{3}} = 0$$